eco2adapt's Newsletter
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"*eco2adapt* is a Horizon Europe Research and Innovation action project funded by the European Union and coordinated by INRAE. It began in September 2022 and will run for five years with 31 partners from 11 countries. The project aims to provide solutions to combat the uncertain effects of climate change and promote resilient forest ecosystems for future generations."

As eco2adapt enters its third year, our consortium continues to demonstrate exceptional scientific progress, strong international cooperation, and growing policy relevance. The past months marked major milestones—from cross-continental summer schools and joint fieldwork campaigns to advances in modelling, surveys, and Living Lab (LL) activities.

2025 has been a highly productive year across our LL network. LL teams in Finland, France, Serbia, Lithuania, and China reported extensive field sampling, wildlife monitoring, LIDAR-based forest scanning, and soil–root symbiosis surveys etc.

eco2adapt teams have been highly active in conferences, including participation in IUFRO China 2025, and national and regional forestry meetings. These contributions strengthen eco2adapt's visibility in the global forestry and climate research community.

Our 3rd Annual Meeting in Kaunas, Lithuania, brought partners together to synthesize ongoing work, refine modelling frameworks, and advance integrative outputs for 2026. Building on the progress achieved there, momentum continues to grow as we move toward the next phase of eco2adapt. The spirit of collaboration, interdisciplinary research, and global partnership remains central to our mission.

Alexia Stokes
October 2025

Ecology and Climate Change

Prof Lei Wang, Zhejiang A&F University

At the invitation of Professor Frank Berninger from the University of Eastern Finland, Professor Wang Lei from Zhejiang A&F University visited the University of Eastern Finland from August 10 to August 25, 2025, to co-organize the summer school “Ecology and Climate Change”. During this visit, he also held discussions with the Joensuu team of the *eco2adapt* project, led by Professor Frank Berninger, on Sino-European collaboration under the *eco2adapt* project.

The summer school was one of the key tasks under Task 6 of the National Key R&D Program of China, titled *“eco2adapt:Regulation Mechanisms of Ecosystem Resilience and Adaptive Forest Management”* It is also part of the collaborative project between the Chinese and European teams under *eco2adapt*, and serves as one of the important means and outcomes for academic exchange, education, and dissemination of climate change adaptation strategies in forestry between China and Europe.

Professor Wang Lei delivered a course titled “Forest Ecosystem Services (Payment for Forest Ecosystem Services)” during the summer school. The course systematically introduced the basic theories of ecosystem services from six perspectives: Concepts of ecosystem services, Case studies of ecosystem services, Ecosystem services valuation, Economic basis for ecosystem services, Methods for ecosystem services valuation and Case analysis of payment for ecosystem services in China Special emphasis was placed on the main theories and methodologies of ecosystem services valuation, along with case studies based on Chinese practices.

Picture (above). Prof. Wang Lei with summer school participants in the field work

Additionally, two professors from the Chinese *eco2adapt* team gave online lectures during the summer school. Professor Rong Yu from Zhejiang A&F University taught the course *"Decision Support System for Adaptive Management of Forest Ecosystems"* and *Professor Zhang Naijing from the Chinese Academy of Forestry taught the course "Forest Ecosystem Resilience Monitoring, Assessment and Early Warning."*

Picture (right). Prof. Wang Lei is delivering his lecture on Payment for Forest Ecosystem Services.

Professor Wang also held in-depth discussions with both the Joensuu team and the Romanian team of the *eco2adapt* project. The included topic was:

- Comparative study of forest resilience laws and policies in China and Finland
- Forest ecosystem resilience prediction based on the DORIAN model
- Stakeholder cognition analysis regarding forest ecosystem resilience
- Comparative analysis of economic, social, and policy drivers of forest resilience

The teams explored potential areas for collaboration, identified topics for joint publication, discussed data collection and analysis plans, and proposed co-supervision of master's and doctoral students based on the project. They also discussed plans for the mid- and late-stage implementation of the *eco2adapt* project.Building on the successful co-organization of the 2025 summer school, the teams are planning for a "Forest Resilience" summer school in 2026.

An IMSI Researcher at North Karelia Living Lab

Dr Žaklina Marjanović, IMSI

In August 2025, Dr Žaklina (Principal Investigator, Serbia) visited LL in Finland and participated in the Summer school organized by Prof. Frank Berninger, University of Eastern Finland. She visited the experimental sites and participated in the sampling. She also gave a lecture at the summer school on the role of mycorrhizal fungi in water acquisition of trees, as well as the role of mycorrhiza in protecting trees from drought.

Picture (above): Sampling at the experimental site in Finnish living lab.

Designing Innovative Insurance Mechanisms for Resilient Forests

Fanny Claise & Marielle Brunette

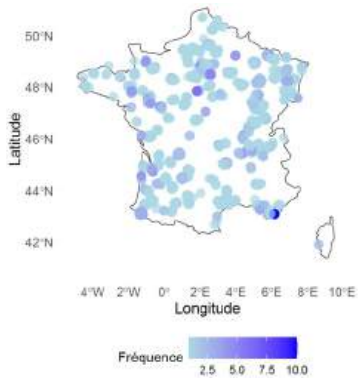
Across Europe, forests are increasingly exposed to natural hazards such as fires, storms, droughts, and pest infestations. These growing hazards threaten not only the ecological functions of forests, but also their economic and social value. As extreme weather events intensify, there is an urgent need to develop innovative risk management tools to strengthen the resilience of forests.Among the existing tools, forest insurance is a promising instrument. However, despite its potential, the uptake of insurance mechanisms varies greatly between European countries, with some having a high adoption rate (such as Finland and Sweden) and others having very low adoption rate (such as France and Germany).

This heterogeneity may be explained by factors on the supply or demand side of the insurance market. On the supply side, factors may include the characteristics of the contract. On the demand side, factors may include the characteristics of forest owners or forest properties.

Picture (right): Focus Group with French private forest owners to test the questionnaire before distribution, Abreschviller (France), November 2023

Work Package 6 (task 6.4) of *eco2adapt* is investigating these various factors and their role to explain the differences in uptake of forest insurance between countries. To understand why uptake remains low in some countries and how new policy and market instruments could promote resilience, we developed a questionnaire. It was translated into local languages, and distributed to private forest owners in eight

European countries (Finland, France, Germany, Romania, Serbia, Spain, Sweden, Lithuania). This unique dataset provides a comparative and innovative basis for analyzing the drivers and barriers to insurance demand in Europe.



Key insights : the case of France

France is a country where forest insurance uptake is low. Based on more than 300 French respondents, the results of the questionnaire reveal that French forest owners are not willing to pay for storm insurance in addition to fire insurance. However, they are willing to pay for a comprehensive package covering several hazards (fire, storm, drought, and pathogens), suggesting a preference for bundled contracts.

Map (left): Geographical representation of respondents in France

In practice, the implementation of insurance solutions by insurers for specific hazards, such as drought or pathogens, could prove particularly difficult. This is because drought and pathogens are often linked to other risks such as storms or fires, and this correlation makes it difficult for insurers to calculate premiums. Parametric or index-based insurance could overcome some of these problems, as it relies on predefined indices (e.g., rainfall thresholds) rather than direct loss assessments. Furthermore, our results indicate that keeping deductibles as low as possible may encourage adoption, as well as offering a one-year contract rather than multi-year contracts.

The results also highlight that demand for insurance is influenced by both individual characteristics (such as gender and income level) and forest property characteristics (forest area, location and certification). The significant impact of income level highlights the question of insurance premium subsidies and the possibility that the French private owners may be receptive to such incentives. In addition, certified forests are significantly more likely to be insured. The certification process could therefore be an effective strategy. Policymakers could promote certification through awareness campaigns. Insurance could also be made mandatory in order to obtain certification, thereby reinforcing the principles of sustainable forest management endorsed by certification programs.

Finally, variables related to knowledge and understanding of insurance mechanisms play a crucial role. Policymakers (with the support of insurers) could therefore promote a culture of insurance and improve communication on this subject.

By identifying these key factors, this study reveals the levers that need to be activated to develop the forest insurance market in France, with potential implications for other European contexts. Ultimately, these findings will serve as a basis for developing recommendations for insurance companies and policymakers.

This communication is based on the following research articles:

Y. Wang, M. Brunette, and F. Claise (2025). Heterogeneity of demand for forestry insurance: Explanations based on a comparison between France and China. WP BETA 2025-14.

F. Claise and M. Brunette (2025). Insurance Demand Against Natural Hazards by Forest Owners: A French Case Study Using Discrete Choice Modeling. WP BETA 2025-42.

F. Claise and M. Brunette (2025). Analyse des déterminants de la souscription à une assurance par les propriétaires forestiers en France. WP BETA 2025-39.

C. Mouminoux, F. Claise and M. Brunette (2024). Separate, Bundled, or Semi-bundled : An Experimental Study on Insurance Contract Preferences. Mimeo.

Khanam, T. et al. Finnish forest-related laws need to acknowledge climate change risks and integrate adaptive strategies to enhance resiliency. Commun Earth Environ ***6****, 332 (2025). https://www.nature.com/articles/s43247-025-02284-3*

Finland's forests are under the stress of a warming climate—more droughts, pest outbreaks, and heavy snow. And this study asks a straightforward but often overlooked question: *Are Finnish forest laws actually preparing the country for these growing risks?*

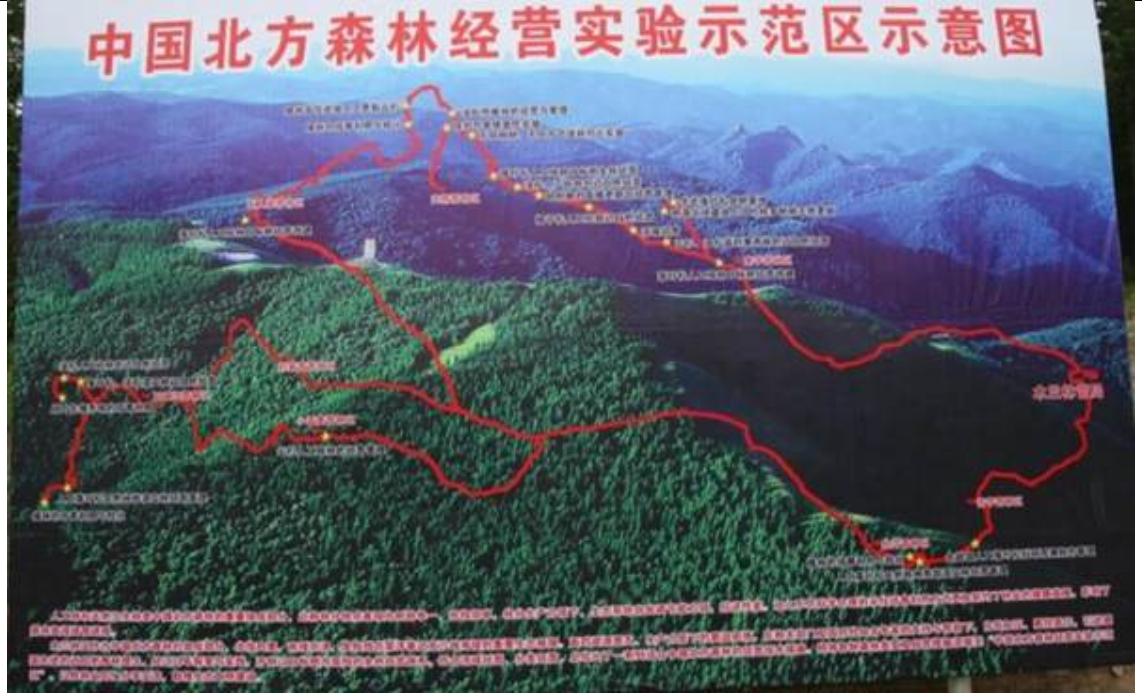
The authors reviewed all major forest-related legislation, national strategies, and voluntary guidelines to understand how well they support climate adaptation. What they found is a system rooted in a strong tradition of sustainable forestry—but one that rarely acknowledges climate change directly. Most laws still focus on conventional goals such as maintaining productivity, reforesting after harvests, protecting biodiversity, removing damaged trees, and maintaining forest road networks. While these actions help maintain forest health, they largely respond to problems after they happen and do little to anticipate the more frequent and severe disturbances expected under climate change.

A similar pattern emerged in non-binding frameworks like the National Forest Strategy, Tapio's guidelines, and certification schemes (FSC and PEFC). These documents recognize that the climate is changing, but they offer very few concrete tools for long-term adaptation. Overall, Finnish forest governance continues to rely on a "business-as-usual" assumption—that current management practices will still be sufficient in a hotter, more volatile climate.

The study argues that this approach may no longer be enough. With climate extremes intensifying across Europe, Finland will likely need clearer legal incentives and forward-looking policies that encourage more diverse tree species, more flexible and risk-responsive silviculture, and proactive planning.

Living Lab in China: Mulan Forest

Planted temperate coniferous forest dominated by Larix principis-rupprechtii and Pinus tabuliformis, located in Mulan Weichang State-owned Forest Farm in Hebei Province, China (Hereinafter referred to as Mulan Forest).



Picture (above). Living Lab of Mulan Forest - forest management demonstration area

Expected Results

The living lab will be applied to conduct research on the resilience of planted forests dominated by Larix principis-rupprechtii and Pinus tabuliformis, simulation of forest growth dynamics, and cost-benefit analysis of various forest management options. It aims to propose a technical model for improving the resilience and quality of typical planted forests in temperate region, and demonstrate the new forest management models in the living lab.

Compared to the control area, forests in the project area are expected to have improved structures of age and diameter, enhanced stand stability, enriched biodiversity and increased forest productivity, and hence have the economic value increased by 5-10% without considering the impact of wood prices.

Picture (above). Traditional management: clear-cut and reforestation with rotation period of 40 years for planted Larix forests

Picture (above). New management: selection forest of Larix through crop tree management

Source: Newsletter of China-EU Project eco2adapt, second Issue

Green Estates – Our Progress and Added Value within *eco2adapt*

Kari Tuomela and Huang Wending

Green Estates is a forestry company specializing in sustainable forest services for both public and private sector clients. While based in Finland, we have developed a specialization in China, where we actively support forestry initiatives by providing strategic consultation, technical planning, and climate adaptation solutions tailored to plantation ecosystems.

Since September 2023, we have been actively involved in developing and implementing a high-level stakeholder questionnaire as part of the *eco2adapt* project. Working closely with partners from the University of Eastern Finland, the Experimental Center of Tropical Forestry (Guangxi CAF), the Research Institute of Forestry Policy and Information (CAF), and Zhejiang A&F University, we co-designed the survey framework and refined the questions through joint meetings and expert consultations.

The aim of the survey was to assess how climate change is perceived by forestry professionals—specifically, how they identify its impacts on forest ecosystems in a changing environment. Throughout 2024, we focused engagement efforts in the Guangxi Zhuang Autonomous Region, targeting forestry companies, research institutions, and government bodies. We distributed more than 50 questionnaires and received 20 completed responses by April 2025. Respondents included managers, R&D leaders, and senior executives, 79% of whom had a background in forestry education. The results were first presented at the *eco2adapt* Joint Meeting held in Sanya, China in April 2025.

The feedback revealed growing concern about the effects of rising temperatures, including increased forest fire risks, pest outbreaks, and water resource instability. Participants noted that climate change is already altering forest growth patterns and increasing pressure on forest operations. Adaptation measures such as selecting climate-resilient tree species, adjusting logging cycles, and improving water management were seen as essential. Looking ahead, stakeholders expect more frequent extreme weather events, shifts in vegetation zones, and biodiversity loss, all of which could reduce forest productivity and challenge long-term planning. They also emphasized the importance of legislation, certification, and science-based tools—such as AI and remote sensing—to guide sustainable forestry under changing conditions.

On 10 April 2025, at the *eco2adapt* Joint Meeting in Sanya, Green Estates co-chaired Session 4, “Technical Model of Forest Ecosystem Resilience and Quality Improvement under Climate Change.” The session was organized in collaboration with the Experimental Center of Tropical Forestry and the Institute of Forest Resource Information Technology, both under CAF.

Six experts presented research on improving forest resilience through species selection, age diversity, and close-to-nature management. They also introduced a new tree growth model and carbon storage forecasting method, capable of predicting development under future climate scenarios. Remote sensing and machine learning demonstrated their ability to deliver high-precision data to support adaptive forest management.

IMSI Researchers – Active Monitoring & Fieldwork in WP3 & WP5

Dr Žaklina Marjanović, IMSI

Picture (above). Palle Madsen gives a lecture on the eco2adapt goals and his work with drones and LIDAR system in forestry.

During 2025, researchers of IMSI have been very active, presumably in WP3 and WP5. We welcomed Palle Medsen and Laura Bonde for the first drone-based scanning using LIDAR technology. Even though the weather was not really on our side, all the recordings were made, and the results are being analyzed. We also used an opportunity to present the *eco2adapt* project and the work of Dr Medsen to the stakeholders.

Wildlife cameras in Serbian LL were reset since they did not produce usable results in the previous period. After solving problems with batteries and proper settling, we got 50+ photos that may provide insight into the wildlife in Serbian LL.

Picture (right). Nikola Šušić (IMSI) and Laura Bonde (InNovaSilva) – the heroes of the field work done in the very harsh weather conditions.

Picture (above). Palle Madsen and the forest owner caught on the wildlife camera in Serbian LL prior to the drone flying.

Within Task 5.3 we have designed the protocol for sampling roots and soils for evaluating the symbiotic potential of dominant tree species in 4 LL (France, Finland, Lithuania, and Serbia). Namely, we intend to evaluate the role of soil biodiversity and symbiotic fungi in supporting the resilience of trees towards changes in climatic conditions. Root and soil samples will be taken three times per vegetative season in two seasons (2025 and 2026). DNA will be isolated, and metabarcoding will be applied to determine the communities of fungi that are associated with roots in different soil microclimate conditions. We will also determine the percentage and content of the soil fungi that are recruited by different tree species, to help them uptake the nutrients and water in critical conditions. The protocol was tested in Serbian LL, while the sampling was performed in all four LL starting from June 2025.

Picture (above) Different species of macrofauna were detected on the wildlife cameras.

Picture (right): Sampling using the exact volume of soil for standardization of the sample. The final look of the properly sampled roots from soil cores.

Picture (above). Different species of macrofauna were detected on the wildlife cameras.

Picture (above). Different species of macrofauna were detected on the wildlife cameras.

Deer Populations on the Rise in Europe: What It Means for Nature and People

Michael Manton, Mindaugas Bakševičius and Darius Hardalau

Research from Vytautas Magnus University and Transilvania University of Brasov have combined in the *eco2adapt* Horizon Project to reveal a steady increase in deer populations across the Baltics, Central, and Eastern Europe. By analysing hunting data from 14 countries, the study examines changes in red deer (*Cervus elaphus L.*), roe deer (*Capreolus capreolus L.*), and fallow deer (*Dama dama L.*) numbers over the past decade (2012-2022). The findings indicate that all three species are growing in population. This

leads to both positive and negative impacts on forests, agriculture, and human safety.

Picture (above). Deer captured on wild game cameras from Lithuania's Dzukija National Park living lab.

Why Are Deer Populations Growing?

One major reason for the increase in deer is improved wildlife management. Many countries have adopted modern hunting strategies that monitor and help control their deer populations to ensure their numbers remain healthy. Additionally, changes in land use, milder winters, and reduced numbers of large predators like wolves have contributed to the rise in deer populations.

The study found that fallow deer populations have grown the most—by more than 50% in some areas, while a decrease was recorded in Germany. Red *deer* numbers have increased significantly in the Baltic states. In contrast, countries like Germany and Austria have lowered their red deer numbers through active population control efforts. While roe deer have become the most common species in Lithuania but decreased in Slovenia.

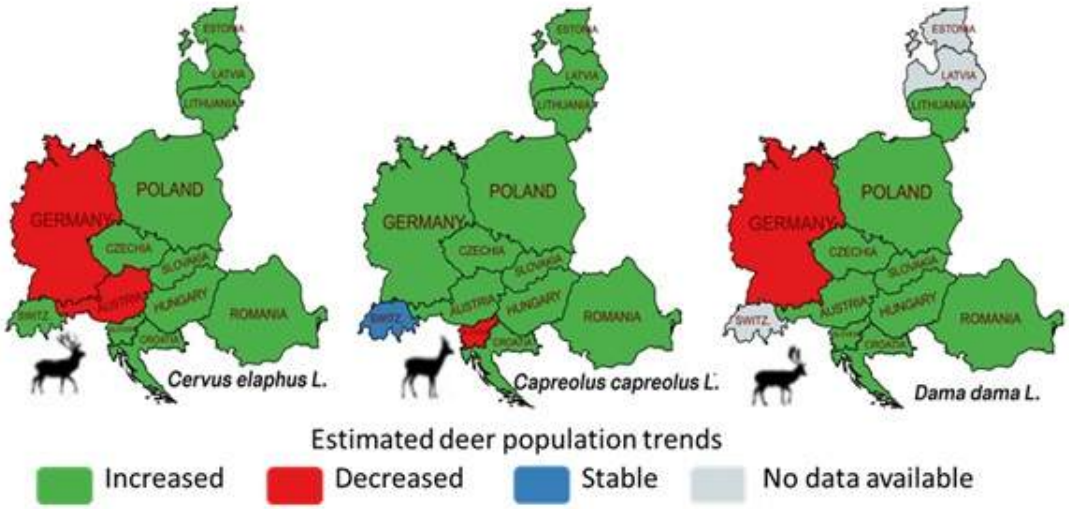
Impact on Forests and Agriculture

Deer play an important role in ecosystems, however over abundance can cause problems to both nature and humans. When too many deer are present, they damage the forest through browsing, fraying, debarking and trampling, making it harder for some species to grow and develop into mature trees. Farmers also report increased crop losses due to deer feeding on wheat, corn, and other plants used by society. Another concern is the rise in deer-related road accidents. As deer populations expand into human-dominated areas, the risk of collisions with vehicles increases, leading to economic losses and safety risks.

The Need for Balanced Management

The study highlights the importance of sustainable deer management. Hunting remains a key tool for monitoring and keeping deer populations in check, but researchers also suggest restoring predator populations and improving habitat management. Countries with high deer numbers may need to increase female culling, as unbalanced sex ratios can lead to faster population growth.

Overall, *eco2adapt* research emphasizes that while growing deer populations indicate successful conservation, they can also pose sustainability challenges. Finding the right balance between conservation, hunting, and land management is needed to maintain healthy ecosystems and minimizing human-wildlife conflicts.



Map (above). Estimated changes in deer population in 14 countries of the Baltics, Central and Eastern Europe between 2012 and 2022 using hunting statistics.

***Further reading**: Ovidiu, I. Hardalau, D. Bakševičius M. Manton, M. et al., 2025. Tracking population trends: Insights from deer hunting harvests in the Baltics, Central, and Eastern Europe. Cent. Eur. For. J. 71 000–000 DOI: 10.2478/forj-2025-0001*

University of Eastern Finland (UEF) Summer School 2025, Joensuu.

Dr. Xudan Zhu, UEF

In August 2025, the Department of Environmental and Biological Sciences at the University of Eastern Finland hosted an international Summer School on Ecology and Climate Change under the *eco2adapt* project. The **"Ecology and Climate Change" Summer School** was jointly organized by the University of Eastern Finland and Zhejiang A&F University.

The program brought together experts from the University of Eastern Finland, Zhejiang A&F University, the Tropical Agricultural Research and Higher Education Center (CATIE), the Chinese Academy of Forestry, the University of Cape Coast, the University of Cuenca, and Wageningen University.

Picture (above). Summer School 2025 techaers and students; Source: Xudan Zhu, UEF

One of the greatest strengths of this summer school is its international team of lecturers and invited speakers. Students had the opportunity to learn directly from leading voices in environmental science, including Prof. Frank Berninger, Prof. Lei Wang, Dr. Tahamina Khanam, Prof. José Ney Ríos Ramirez, Prof. Zaklina Marjanovic, Dr. Xudan Zhu, Dr. Abul Rahman, Dr. Rong Yu, Dr. Naijing Zhang, Dr. Julia Quaicoe, among others. Together, they bring expertise from across Europe, Asia, Latin America, and Africa, ensuring that participants gain both scientific depth and a truly global perspective.

In the first week, the Summer School began with fieldwork along the River Kuusoja, where students collected water samples to gain insights into boreal ecosystem functioning. Back in the laboratory, participants engaged in laboratory analyses, including pH, DOC, DIC, isotopes, and spectral absorbance, under the guidance of an international team of experts. Throughout the program, students also worked with empirical data, practiced visualization techniques, and explored innovative applications of artificial intelligence in addressing ecological questions.

Pictures (above). Summer School 2025 lab experiments in North Karelia Living lab; Source: Xudan Zhu, UEF

Pictures (above). Summer School 2025 Field work and lab experiments in North Karelia Living lab; Source: Xudan Zhu, UEF

Pictures (above). Summer School 2025 techaers and students field works in North Karelia Living lab; Source: Xudan Zhu, UEF

In the second week, attention turns to peatlands, modelling, and social ecology. Students investigated carbon dynamics in peatlands, learned about extreme events and hydraulic modelling, and took part in theme sessions covering everything from DOC export to precipitation modelling.

Picture (above). Dr. Tahamina Khanam providing lecture on forest valuation; Source: Xudan Zhu, UEF

Social Ecology Day brings a global perspective, with experts discussing ecosystem services in China, Latin America, and Europe, alongside the valuation of forests as climate solutions. The program concludes with engaging final presentations, where participants showcase their findings and reflect on the future of community water management and sustainable ecosystems.

Pictures (above first row): Dr Marjanović (IMSI) and Prof. Frank Berninger (UEF) giving a lecture and clarifying some selected issues to the students. Pictures (above second row): Students are presenting their reports. Source: Xudan Zhu, UEF

Over two intensive weeks, participants explored how ecosystems respond to climate change while developing hands-on research skills in both field and laboratory settings. Activities ranged from river sampling and peatland studies to advanced isotope analysis and dissolved organic carbon (DOC) modelling, giving students the opportunity to experience the full cycle of ecological research—bridging theory, practice, and international collaboration.

Meanwhile, a strong network between international students and experts was established through these interactions, laying the groundwork for future collaborations.

Picture (right). A gathering after completing several sessions.

eco2adapt participated in organizing two forest excursions to Ruunaa in Lieksa on 12 and 25 September 2025

The first of the excursions took place on 12 September, when the sixth graders from Porokylä School in Nurmes arrived in Ruunaa to learn all kinds of new things about forests and nature. The sunny day began with a small snack, after which the students set off in groups to visit the field stations that had been prepared. At the stations, the students were able to explore the forest via a sensory walk, hear about and discuss everyman's right, and get acquainted with a biodiverse forest.

After lunch, the students got to assemble their own "Sibelius box," that is, a matchbox into which they gathered nature's little delights and sources of inspiration. The box's name comes from composer Jean Sibelius, who carried a small moss-filled box with him so that he could immerse himself in the forest atmosphere wherever and whenever he wished. The wonderfully successful day concluded by the rapids of Neitikoski.

The second excursion was organised on 25 September, with the theme of forest fires and forests' climate resilience.

Picture (right). Students craft their Sibelius Boxes

Participants included Erasmus+ guests from, among other places, Greece and Turkey, as well as students from Nepenmäki School. The day dawned cool but sunny as participants arrived at the first location, Reposuo in Lieksa. There they were offered light refreshments and a short lecture on Finnish mires. From Reposuo the journey continued to Ruunaa, where students from Karelia University of Applied Sciences had brewed traditional camp-fire coffee.

Picture (left). Lecture on "Introduction to Finnish Mires.

Picture (above). Journey to Ruunaa and Traditional Camp-Fire Coffee.

After coffee, part of the group set off to tour the stations in the nearby terrain, while another part headed to the controlled-burn site along a more challenging route. Next came a hearty lunch, after which everyone made their way to Neitikoski. The walk to the rapids took the form of a forest-mindfulness stroll, and once everyone reached the rapids it was time for a group photo. Before departing, the guests received a small travel snack and commemorative diplomas. The day was deemed a great success by both participants and organisers.

Source: Leena Leskinen from FFC's LinkedIn profile

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eco2adapt 3rd Annual Meeting 2025– Kaunas, Lithuania

The 3rd Annual Meeting of the *eco2adapt* project took place at Vytautas Magnus University (VMU) in Kaunas, Lithuania, from Monday, 3 November to Friday, 7 November 2025. The week-long event brought together project partners, work package (WP) leaders, and stakeholders to review progress, share updates, and strengthen collaboration across regions and disciplines.

The program featured project-wide presentations, field visits, workshops, and interactive sessions focused on ecosystem resilience, stakeholder engagement, and policy integration. The agenda balanced formal discussions with opportunities for private meetings, networking, and on-site learning—fostering both scientific exchange and community building.

Stay tuned with us until our April 2026 series for the full story…

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